PARSLEY ROOT

Petroselinum crispum (Mill.) Fuss

Family

Apiaceae (Umbelliferae) - the carrot family.

Parts Used

Root.

Description

Parsley is native to the Mediterranean but naturalised throughout Europe. Parsley is now heavily cultivated especially in the U.S., Europe and western Asia. It is a small, bright green biennial that reaches 30cm the first year and up to a metre in the second year when it flowers. The plant has a thick, carrot like taproot and juicy stems terminating in feathery, deeply divided, curly or flat leaves, depending on the variety. Its tiny yellow-green flowers develop an umbrella like canopy (umbels). In some regions it is known by its synonym *Petroselinum hortense* Hoffm.[1] Two of the most popular parsley varieties are *Petroselinum crispum var. crispum*, also known as curly-leafed parsley, and *Petroselinum crispum var. neapolitanum*, referred to as flat-leaf parsley or Italian parsley.

'Hamburg' root parsley (subspecies *tuberosum*) is also cultivated. It grows in sunny, or slightly shaded, areas that have humid soil with a pH level of 5.3 to 7.3. Parsley roots grow up to 20cm in length and 5cm in width. If parsley is being cultivated for its roots then these are collected in the first year. The root, seeds and the leaves are all used medicinally with the seeds containing high amounts of volatile oil which yield apiol.[2,3,4]

Traditional Use

Parsley is documented in many old herbals and was revered for its medicinal uses as well as for sacred and superstitious reasons. Dioscorides named parsley 'rock celery' because the undomesticated plant grew amongst rocks. The genus name comes from the Greek *petros*, meaning rock, and *selinon*, meaning celery. In the sixteenth century parsley was known as *A. hortense, hortense* meaning gardener in Latin. The ancient Greeks believed that parsley originated from the blood of Archemorus, the 'Forerunner of Death'. The herb was a symbol of imminent death and was used in funeral rites. For example parsley was given to the terminally ill and parsley garlands were placed on corpses. There was a Greek saying 'to be in need of parsley' which meant that someone was extremely ill and not expected to survive. Parsley also eventually became associated with Satan and was dedicated to the queen of the underworld, Persephone. Virgins were warned not to plant parsley for doing so would result in losing their virginity to Satan. The Greeks believed that the parsley seed travelled to and from the underworld several times before germinating. Due to these negative associations parsley was not consumed or incorporated into dishes. Interestingly, the Greeks began to crown athletic victors with parsley wreaths in memory of important predecessors. Over time, parsley shifted from a symbol of death and Greek gardens were often bordered with parsley and rue. It has a long history of use in cooking as well as being popular as a digestive tonic, diuretic and general healing plant.[5,6]

Traditionally it has been used for flatulent dyspepsia, colic, cystitis, dysuria, bronchitic cough in the elderly, dysmenorrhoea, functional amenorrhoea, myalgia and specifically for flatulent dyspepsia with intestinal colic. In the 1930s it was mentioned in the classic book A Modern Herbal, the first comprehensive encyclopaedia of herbs to appear since the days of Culpeper (1600s). The author Maude Grieve said a strong decoction of the root is of great service in gravel, stone, congestion of the kidneys, dropsy (oedema) and jaundice. She said a fluid extract of the root acts more readily on the kidneys than that from other parts of the herb. Culpepper himself said "Galen commended it against falling sickness, and to provoke urine mightily; especially if the roots be boiled, and eaten like parsnips." Parsley was also considered a useful galactagogue stimulating both the amount and flow of breastmilk. In Morocco parsley is used traditionally to treat hypertension and other cardiovascular diseases and in Turkey it is used to treat diabetes. Apiol and other actives such as myristicin obtained from parsley seeds have been used for malaria and as an emmenagogue.[7,8,9,10,11]

Constituents

Essential oil makes up 0.2 to 0.75% of parsley's roots. The oil mainly consists of terpinolene, β-pinene, and phenylpropanoids apiol (sometimes called parsley camphor) and myristicin. Additionally, apiin makes up 0.2 to 1.6% of the roots and is from a large subset of phenolic compounds known as flavonoids. Apiin is a glycosidic form of apigenin, which has been shown to help prevent chemoresistance. Phthalides including: ligustilide, senkyunolide, and butylphthalide as well as polylines such as falcarinol and falcindirol are also in the roots.[12]

Actions

Antioxidant, antimicrobial, anti-inflammatory, laxative, antihyperlipidemic, anticoagulant and hepatoprotective, carminative, spasmolytic, expectorant, diuretic, antirheumatic, emmenagogue, galactagogue.[13,14]

Pharmacological Activity

There is a lack of clinical research assessing the efficacy and safety of parsley, especially the root.

Antioxidant and Antidiabetic Activities

A 2016 study provides scientific evidence for the traditional use parsley as an antidiabetic and antioxidant agent in type 1 diabetes mellitus. Medicinal plants are effective in controlling plasma glucose level with minimal side effects and are commonly used in developing countries as an alternative therapy for the treatment of type 1 diabetes mellitus. The aim of this study was to evaluate the potential antidiabetic and antioxidant impacts of parsley leaf (which

has similar constituents to the root) and *Balanites aegyptiaca* (Desert date) extracts on streptozotocin-induced diabetic and normal rats. The herbal preparations significantly reduced the mean plasma glucose and MDA levels and significantly increased the mean plasma insulin, L-PK, and TAC levels in the treated diabetic groups compared to the diabetic control group. An obvious increase in the weight of the pancreas and the size of the islets of Langerhans and improvement in the histoarchitecture were evident in the treated groups compared to untreated ones.[15]

Free radicals lead to oxidation of biomolecules which then lead to cell damage or death. Antioxidants mitigate the effects of oxidative stress by scavenging these free radicals and donating electrons to them in order to keep biomolecules intact and undisturbed. Myristicin and apiol are believed to be the major contributors to the observed antioxidant properties of parsley, which are characteristic of phenolic compounds. A Chinese study supported this hypothesis by testing antioxidant capabilities through three *in vitro* assays. While the metal chelating properties were insignificant, parsley's essential oil showed activity in β-carotene bleaching and free radical hunting. Apiol showed more free radical scavenging activity than myristicin despite being present in lower concentrations. The presence of an additional methoxyl group, a prominent electron donor group, most likely contributes to this observed difference.[16]

A study examined the potential antioxidant effects of parsley and celery against doxorubicin (a cytotoxic drug) induced reductions in glutathione and antioxidants. Only parsley root juice significantly increased the content of cytochrome P450 and liver detoxification potential.[17]

The *in vitro* and *in vivo* antioxidant activity of different extracts of leaves and root of parsley were studied. Both free radical scavenging and lipid peroxidation were evaluated. The results found all examined extracts were good scavengers of free radicals and also reduced the intensity of lipid peroxidation. The *in vivo* effects were evaluated on some antioxidant systems in the mice liver and blood after treatment with parsley, or in combination with carbon tetrachloride (CCl(4)). The parsley extracts exhibited a protective effect but also showed both positive and negative synergism, inducing or suppressing the influence of CCl(4) alone. On the basis of the results obtained it could be concluded that the examined extracts exhibited a certain protective effect.[18]

Antimicrobial Activities

Parsley has evolved defense mechanisms against microbial predators such as bacteria and fungi. The secondary plant phenolic compounds such as apiol, myristicin and furanocoumarins play important roles in these functions. One study extracted parsley leaves in a 70% alcohol solution after they were washed, dried, and ground up. The solution then underwent filtration and evaporation to obtain a semi-solid residue. This parsley extraction showed significant inhibitory activity against *Staphylococcus aureus*.[19]

A small portion of apigenin provided by food reaches the human circulation and, therefore, may reveal biological effects. The absorption and excretion of apigenin after the ingestion of apiin-rich parsley was tested. Eleven healthy subjects took part in this study. After an apigenin and luteolin free diet a single oral intake of 2g of blanched parsley per kilogram body weight was consumed. On average, a maximum apigenin plasma concentration was reached after 6 to 8 hours with a high range of variation between subjects. The flavone could be detected in red blood cells without showing dose-response characteristics.[20]

Another study found that parsley had free radical scavenging and antilipoperoxidant effects with apiin being the main active constituent and the authors suggested there was a synergy between different components of the whole herb extracts.[21]

Anti-inflammatory and Anticancer Activities

The immune system protects humans from foreign antigens and wards off microbes among others. However chronic activation of the immune system results in inflammation and is linked to tissue damage, neuropathological diseases, and autoimmune disorders. Myristicin found in parsley has been shown to reduce inflammation, by inhibiting the production of nitric oxide and cytokines, inflammatory proteins released by the immune system, through the calcium pathway.[22]

An Iranian study treated mice splenocytes, white blood cells from the spleen, with phytohemagglutinin (PHA) or lipopolysaccharide (LPS) in order to stimulate an immune response from the T and B cells respectively. In the experimental group treated with PHA, parsley essential oil suppressed T-cells proliferation and therefore inhibited the growth of the splenocytes. Parsley's essential oil displayed similar suppression of B-cells but only at higher concentrations. Therefore parsley seems to be more efficient at targeting T-cells. These researchers also found that parsley suppressed nitric oxide concentrations without toxic effects.[23]

Apigenin has been shown to have a strong anticancer effect on various cancer models via a programmed cell death, apoptosis. In particular the protein vimentin in apigenin, was shown to be responsible for this physiological role, decreasing cell migration, angiogenesis and adhesion.[24]

Another study showed that apigenin is a potential chemopreventive agent due to the induction of leukemia cell-cycle arrest.[25]

Apigenin from parsley was found to inhibit angiogenesis through inhibiting the vascular endothelial growth factor.[26] Another study suggested that apigenin may inhibit human lung cancer angiogenesis by inhibiting hypoxia-inducible factor and vascular endothelial growth factor expression, thus providing a novel explanation for the anticancer action of apigenin.[27]

The effects of several polyphenols on the growth and metastatic potential of B16-BL6 melanoma cells *in vivo* were examined. The anti-invasive activity of quercetin and apigenin was shown to be one of the mechanisms underlying their ability to inhibit melanoma growth and invasive and metastatic potential.[28]

Diuretic Activities

The diuretic effect associated with the consumption of parsley may be attributed to the pharmacological activities of myristicin (sympathomimetic action) and apiole (irritant effect).[29]

Progesterone Activities

In a recent study apigenin was shown to exert inhibitory activity on an enzyme 20-α-hydroxysteroid dehydrogenase. The induction of this enzyme is thought to be responsible for the decrease in plasma progesterone. The researchers proposed the possibility that the flavonoids fisetin, apigenin, naringenin, luteolin, quercetin and kaempferol augment progesterone signaling by inhibiting potently 20alpha-HSD activity in non-reproductive tissues. Parsley root contains the glycoside apiin, formed by the combination of apigenin with sugars. So in theory the parsley root could have the same effect as the parsley leaf regarding the progestogenic action.[30]

Indications

- Gastrointestinal disorders such as constipation (short to medium term use), flatulent dyspepsia with intestinal colic, gall bladder problems especially gall stones
- Urinary disorders such as cystitis, painful urination, treatment and prophylaxis of kidney gravel
- Bronchitic cough in the elderly
- Poor appetite, weak digestion
- Dysmenorrhoea, functional amenorrhoea
- Muscle pain
- Diabetes
- Hypertension
- Oxidative stress
- Possible adjunctive use in some cancers

Energetics

Sweet, warm and moist; with a secondary quality of nourishing, restoring and dissolving. It enters the spleen, liver, chong and ren meridians; influencing the blood, fluid, stomach, kidney and liver. The organism is air and fluid.[31]

Use in Pregnancy

While safe to consume in culinary dishes, the use of the essential oil and fluid extract is contraindicated due to the emmenagogic action and potential for it to be abortifacient. In the past parsley root was used as an abortifacient.[32]

Contraindications

None known.

Drug Interactions

None known.

Administration and Dosage

Liquid Extract:	1:1
Alcohol:	25%
Weekly Dosage:[33]	40 to 80mL

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